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MEMORANDUM FOR PRS (In-House/Contractor Publication)

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FILE

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12 Nov 2002

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-AB-2002-282**
J.A. Muss (Sierra) et al., "The Performance of Hydrocarbon Fuels with H₂O₂ in a Uni-element
Combustor" (abstract only)

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AIAA Joint Propulsion Meeting
(Huntsville, AL, 20-23 July 2003) (Deadline: 6 Dec 02)

(Statement A)

The Performance of Hydrocarbon Fuels with H_2O_2 in a Uni-element Combustor

An Abstract for the 2003 AIAA/JPC

By

Jeff Muss, Curtis Johnson
Sierra Engineering, Carson City NV
William Kruse
TRW, Redondo Beach, CA
Richard Cohn
AFRL/PRSA, Edwards AFB, CA

A team including Sierra Engineering, AFRL, and TRW tested several different hydrocarbon fuels in a 1200 pound thrust hydrogen peroxide/ hydrocarbon rocket uni-element combustor at the AFRL propulsion directorate Edwards AFB research site. Tests were conducted with a variety of hydrocarbon fuels, including JP-8, RP-1, JP-10, toluene, quadricyclane, and turpentine as well as a several mixtures of these listed fuels. The combustor used decomposed hydrogen peroxide at concentrations of 90% as the oxidizer. The water-cooled combustion chamber included significant fuel film cooling with an overall mixture ratio between 4 and 6. All testing was conducted at a chamber pressure of approximately 780 psia.

Figures of merit to be presented in this paper include characteristic velocity and energy release efficiencies. The experimental performance results were compared with computations performed by PERCORP, a program for predicting mixture ratio striations within the engine, and TDK. Agreement was generally excellent, C^* and ERE agreeing to within 1%.

During the course of testing, several chemicals normally not used as a rocket propellant were tested. This paper will also cover some of the operational issues regarding the use of these propellants in rocket propulsion testing.

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